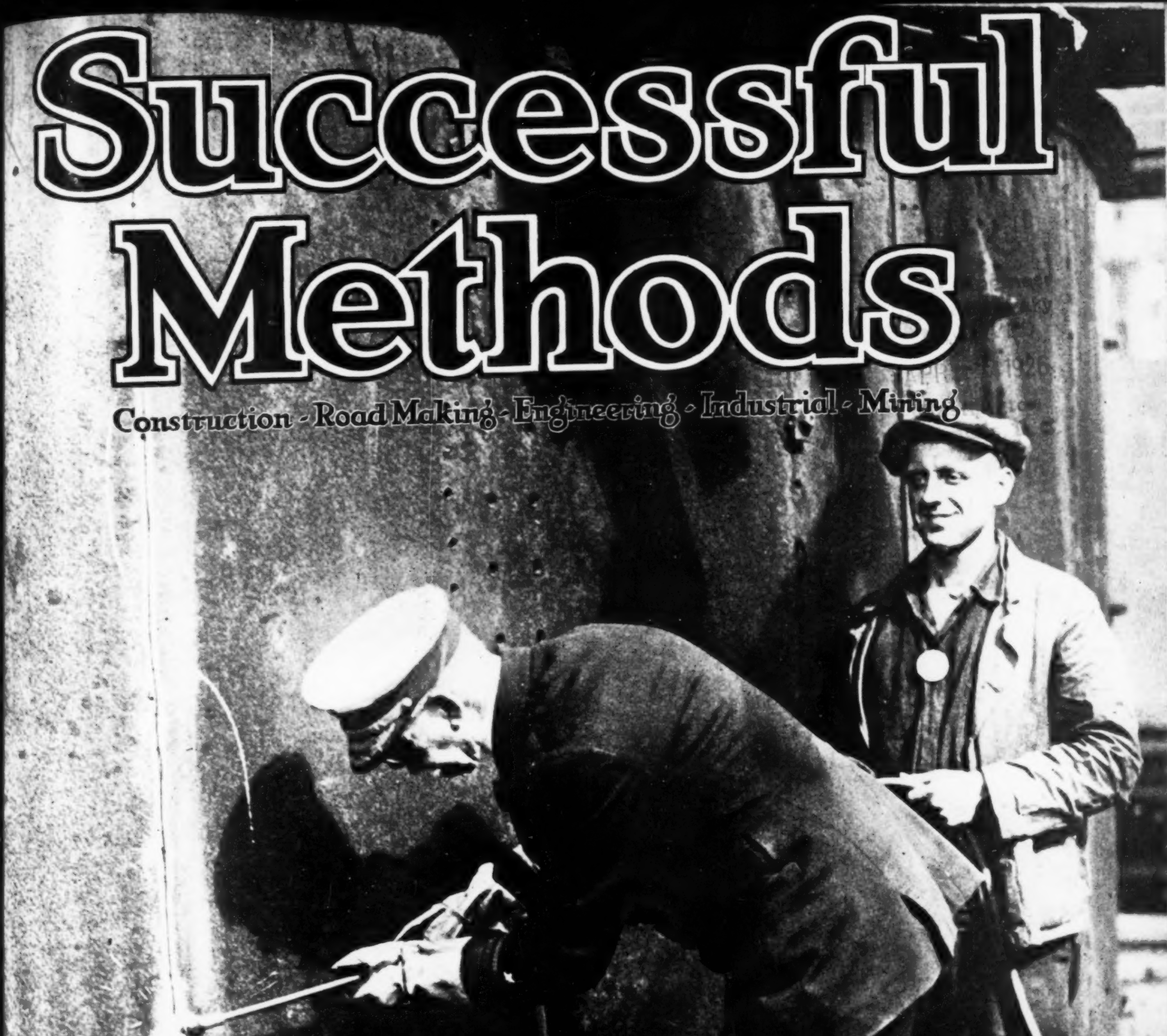
Successful Methods

Construction - Road Making - Engineering - Industrial - Mining



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Successful Methods

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Destroying to Save

AN American admiral directing the destruction of American battleships a few years ago would have been shot at sunrise. Now he can go openly and proudly about his job, as is shown by the picture on our front cover.

The oxygen-acetylene torch makes the cost of the scrapping cheap, as compared with any other method that might have been used. The junk value of the materials, however, is relatively small. But there is an immense saving in upkeep. There also is a still greater saving due to the removal of the need for more and bigger ships.

All this saving means vast sums for public buildings, roads and other improvements. Meanwhile, the European nations go on adding to their hates, and to their war machines. Sooner or later they must learn to trust one another and to build constructively, or they will go down with the destructive plans they sponsor.

Balancing the Load

NEXT spring the construction industry will almost certainly be in the worst jam in its history. Labor conditions have been bad during the last twelve to fourteen months. Prices and deliveries of material also have turned many a good contract into a loser. But construction labor and materials will both be scarcer and higher next spring, unless drastic action is taken to do this winter a vast amount of new work scheduled to begin after the end of cold weather.

The American Construction Council recently issued a timely warning of the great need for distributing construction work over the whole year. Their statement is very conservatively drawn. Reading between the lines it is evident that the thoroughly experienced men who make up that organization sense a critical congestion next spring.

In spite of the evidence of what is likely to happen in the way of a labor shortage, and higher wages, and a scarcity of materials with higher prices, comparatively little work is likely to be started ahead of regular spring schedules. This is due partly to habit, and partly to ignorance of comparative summer and winter costs, under present conditions.

This ignorance is well illustrated by the attacks made on a statement in these columns last month to the effect that brickwork done in the summer was costing one large concern as much as two and a half times what winter brickwork cost them, under present conditions. One architect went so far as to write us that such a statement was "unqualifiedly untrue." He knows it is untrue because he has had twenty years' experience. Present conditions are those that have to be met. We are in a new set-up of affairs in the construction industry. Most of the successful builders of the country are awake to what they are up against now. Many of them also sense what is going to happen next spring. These are using all their influence to have owners do all the construction work possible this winter.

The Two Big Events

PLANS for the 1924 convention and road show of the American Road Builders' Association are practically complete. Space will be allotted to the exhibitors Nov. 1 at Chicago. The number and character of applications for space on hand at this writing exceed what seemed probable even in view of the success of the last show. In fact, the management is confronted by a very serious problem in trying to give all a chance to exhibit. A rearrangement of aisles and other changes will, however, provide considerably more space than was available previously. The road show is, therefore, certain to be the biggest and certainly the best that has ever been held. It will, incidentally, be the most valuable exhibition of industrial machinery ever assembled anywhere.

Arrangements for the convention also are nearly completed. The program of the last convention was a great improvement over anything of the sort ever staged. This year the program committee has planned discussions on even more timely subjects. Standardization of material and equipment will particularly be stressed. Ways of improving relations between the contractor and the engineer also will be up, so all may have their say. Highly technical subjects will be less in evidence than heretofore.

Chicago will entertain in January the greatest gathering of road builders ever in one city. There will be room for all, and to spare, if reservations are made in advance. Better get yours on the way now.

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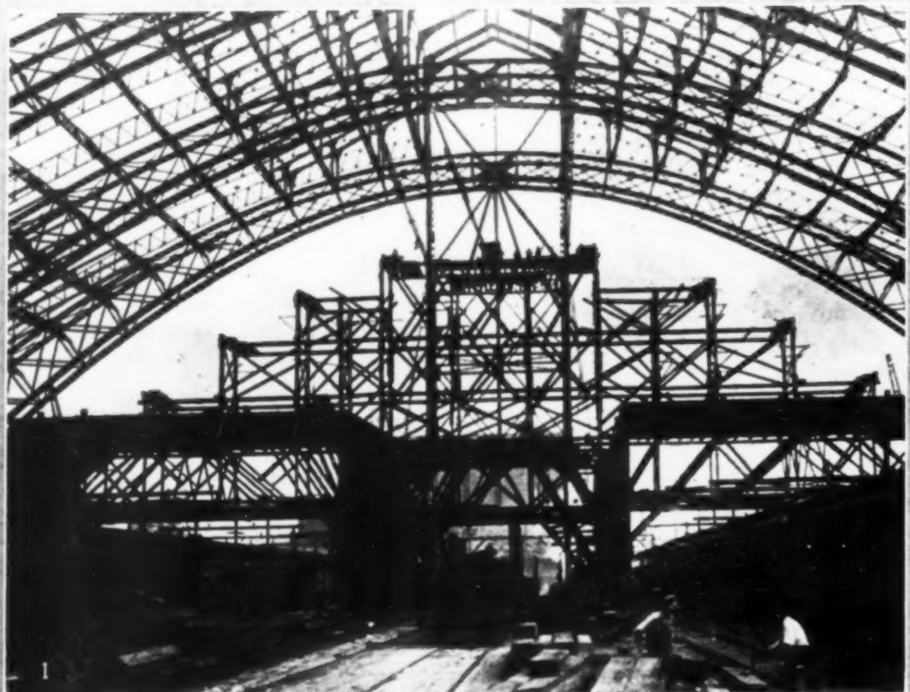
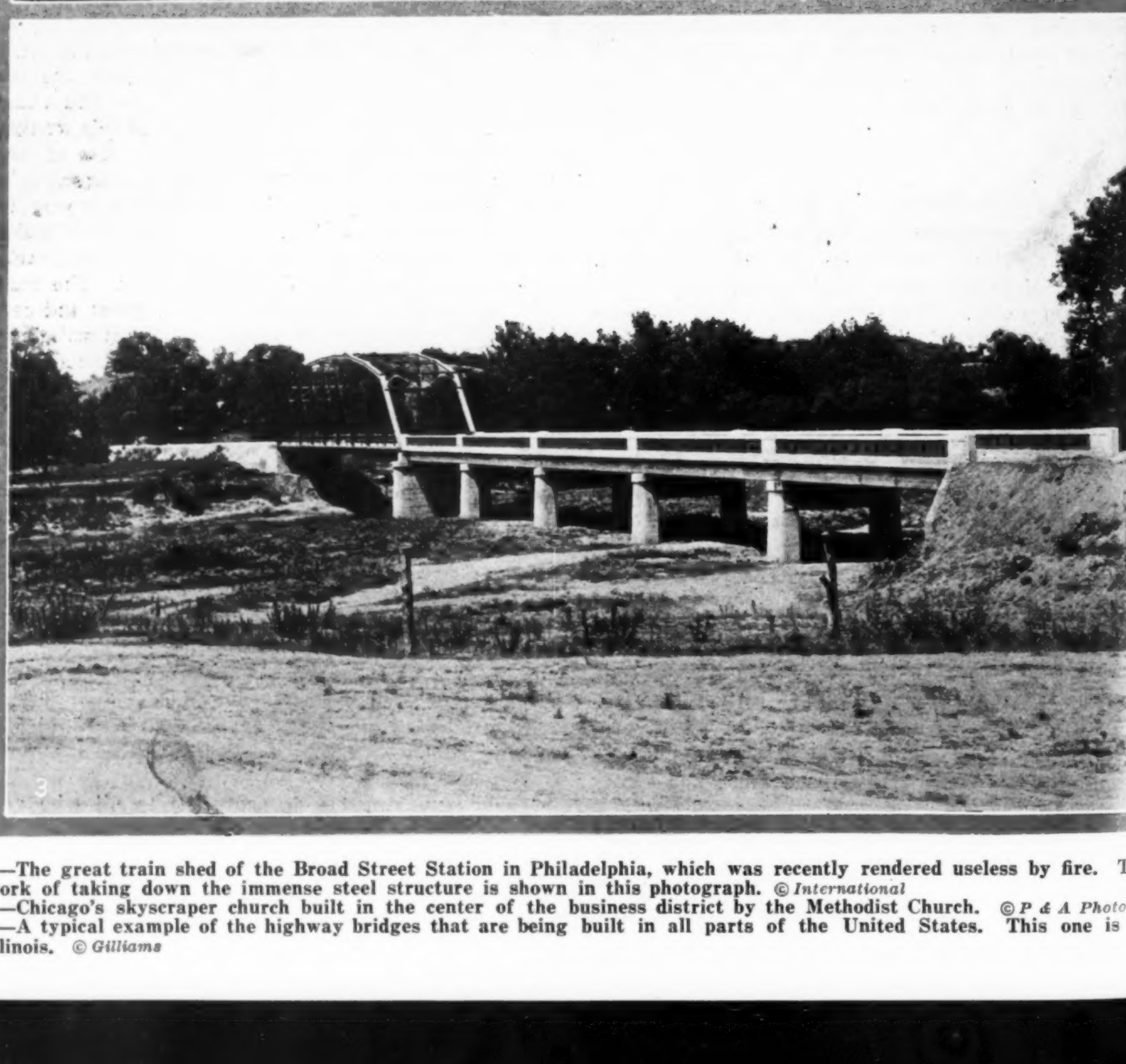
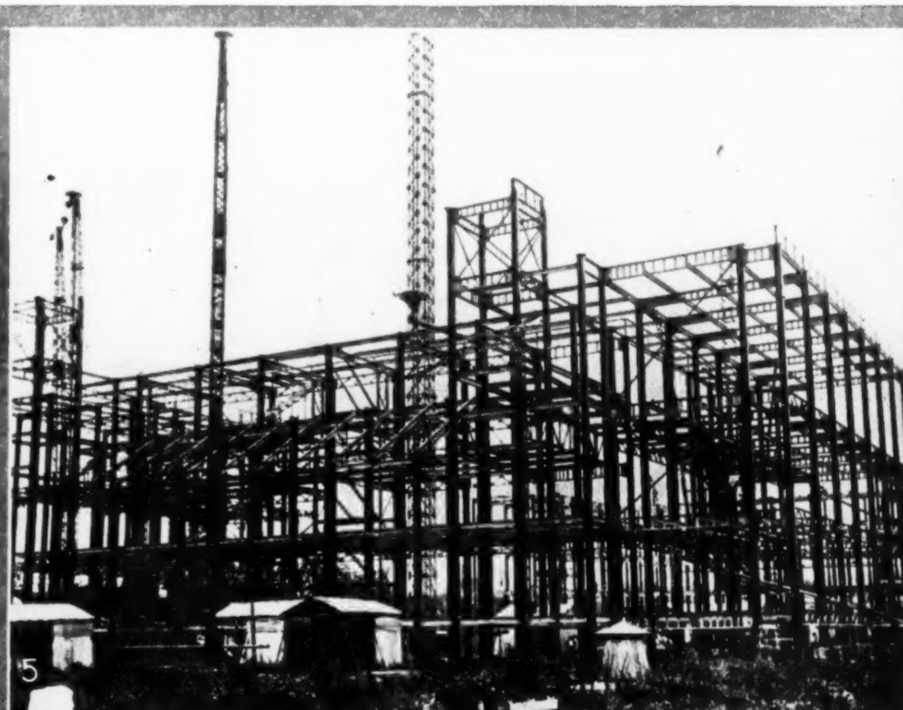
Construction Snapshots





1—The great train shed of the Broad Street Station in Philadelphia, which was recently rendered useless by fire. The work of taking down the immense steel structure is shown in this photograph. © *International*
2—Chicago's skyscraper church built in the center of the business district by the Methodist Church. © *P & A Photos*
3—A typical example of the highway bridges that are being built in all parts of the United States. This one is in Illinois. © *Gilliams*

At Home and Abroad



4—The naval war memorial at Plymouth, England, which is being put up to commemorate the defense of the seas during the World War. The statue of Sir Francis Drake, who performed a similar service centuries ago, is in the foreground. © *P & A Photos*

5—The steel framework of the new Parliament building in Tokio, which was only slightly damaged by the earthquake. As may be seen, the steel chuting tower and derricks remained erect. © *International*

6—Bridge building at Kiev in the Ukraine. This structure when completed will be set up across the Dneiper River to replace a bridge destroyed during the Polish invasion. © *International*

STEEL CHUTING TOWER BUILT OF STANDARD PARTS

Double Counterweight Plant Works Efficiently on Reservoir Job Near Pittsburgh

A CONSTRUCTION job that is being efficiently put through is now under way near Pittsburgh, Pa., where the American Construction and Sureties Company is building a concrete-lined reservoir for the South Pittsburgh Water Company. This reservoir is being constructed in a natural gully and the project also includes the building of a new coagulating basin and filters.

The size of the reservoir is 400 ft. by 150 ft. and it will have a capacity of 10,000,000 gal. It will be lined with slabs 9 in. thick and approximately 6000 yd. of concrete will be poured. Work began on the reservoir about July 15 and is now more than 50 per cent completed.

The most conspicuous unit of the concrete plant is the standard steel tower assembled from nine standard parts. This tower is 150 ft. high and, if necessary, can be carried up more than 200 ft., the only changes required being the alteration of the back legs to correspond with the front legs, only a minor operation.

The plant is a combination continuous line chuting and double counterweight plant. Approximately 850 ft. of 2-in. plow steel cable are used to carry the high-line which runs from the top of the main tower and then passes over a tail tower on the other side of the gully, as may be seen in the larger photograph at the bottom of the page.

The first counterweight section is an extra heavy 50-ft. section of chute, built so as to carry a second counterweight and strong enough to be tied when poured. The second counterweight is a 50-ft. light counterweight and is supported by a gin pole if additional chute is used from it. The rest of the chute is made up of 10-, 20- and 30-ft. standard chute sections.

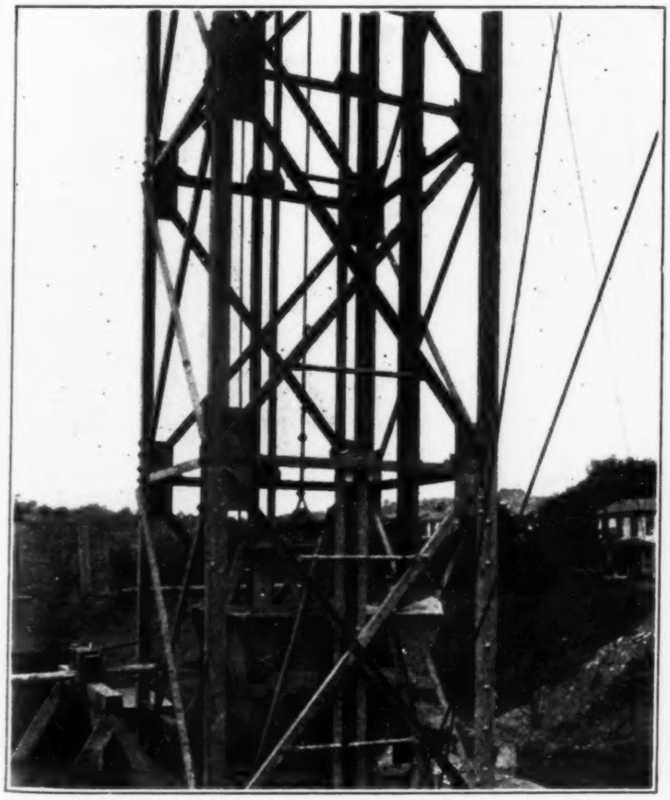
In order to counterbalance the heavy counterweight when pouring, a weight of 7500 lb. is used. This weight consists of pig lead on the truss and a concrete block which together gives 6000 lb., the remaining

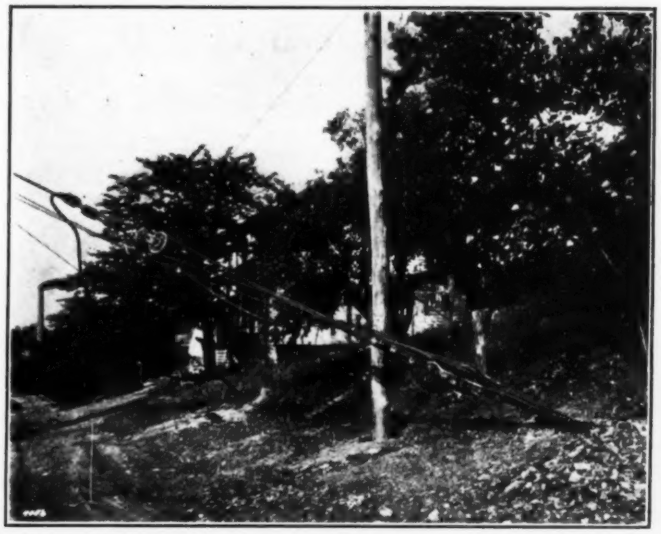
A GENERAL VIEW OF THE JOB SHOWING THE MAIN TOWER, THE TAIL TOWER AND CHUTE WITH COUNTERWEIGHTS

weight being supplied by a section of 20-in. cast-iron water pipe which is filled with concrete. This extra weight has an axle cast in the concrete, so that it may be moved about the reservoir. It may be seen plainly in one of the pictures. The first 3000 lb. thus gives the additional 1500 lb. of counterweight balance as well as an excess weight of 1500 lb. which acts as a safety feature.


THE CHUTE AT CLOSE RANGE. THE CAST IRON PIPE LOOKING LIKE A ROLLING PIN MAY BE SEEN AT THE EXTREME LEFT

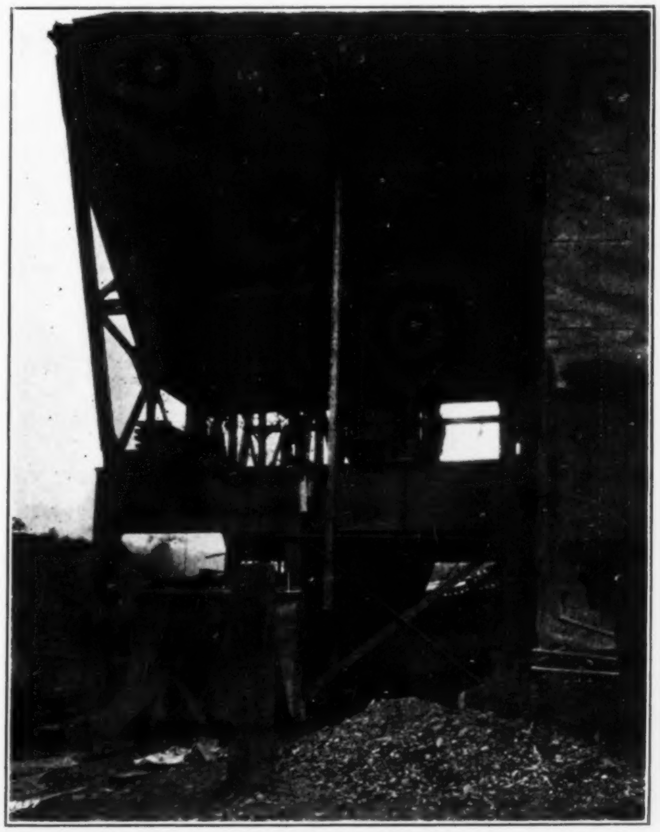
Fast work was the rule from the moment the job started. The tower was put up quickly. G. F. Heide, engineer in charge, his clerk, a carpenter and two laborers erected the first 45 ft. in about 6 hr., as well as building their gin pole. This was made possible


THE BASE OF THE MAIN TOWER SHOWING DETAILS OF CONSTRUCTION


THE TAKE UP DEVICE WHICH WAS OPERATED WITH THE AID OF A 5-TON TRUCK

by the use of the standard parts, such as braces, girts, angles, etc.

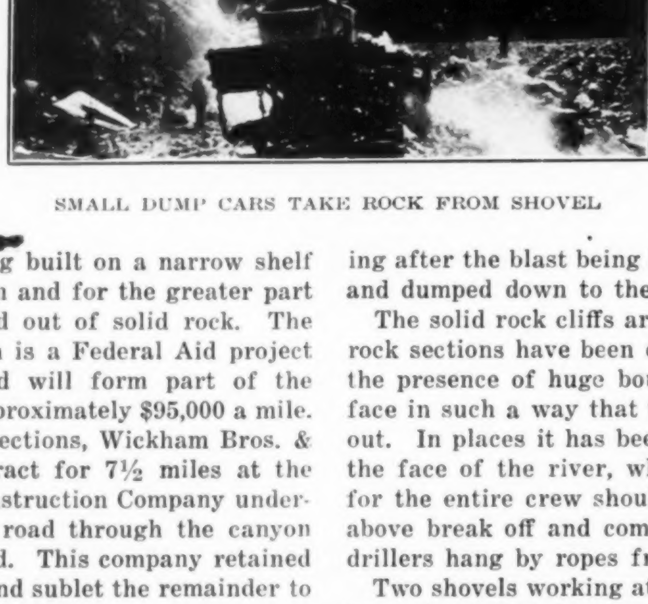
Since the job has been under way, runs of 270 cu. yd. in 10 hr. have been made repeatedly. When the plant is in operation only seven men are required from bins to forms in placing the concrete.


THE BATCHER PLANT WHICH SUPPLIES THE MIXER

One of the small photographs shows the scheme devised by Mr. Heide to take up the slack in the high-line cable. This takeup device is so arranged that by attaching a 5-ton truck to the pull line it is possible to take up the slack in the main cable without the slightest difficulty. It handles the job quickly and efficiently.

THROUGH THE WIND RIVER CANYON

Wyoming Is Cutting a Scenic Highway Out of Solid Rock



SMALL DUMP CARS TAKE ROCK FROM SHOVEL

ONE of the notable bits of highway construction now under way in the United States is the building of the Wind River Canyon road by the State of Wyoming. The word "bit" may possibly be applied to the length of the road, as the canyon is only a little more than 11 miles long, but it loses force when applied to the magnitude of the job from a construction point of view.

The new highway is being built on a narrow shelf along the side of the canyon and for the greater part of the way is being blasted out of solid rock. The cost of this highway, which is a Federal Aid project and which when completed will form part of the Yellowstone Highway, is approximately $95,000 a mile.

The job was let in two sections, Wickham Bros. & Schweiger taking the contract for 7½ miles at the upper end and the Utah Construction Company undertaking the building of the road through the canyon and 2 miles at the lower end. This company retained some of the heaviest work and sublet the remainder to the Christensen Construction Company.

The character of the work on the project is shown in the photographs on these two pages. Most of the earth grading of the section approaching the canyon was done with fresno scrapers. The rock work consisted of blasting and then casting the material with steam shovels down to the edge of the river. At one point small side dump cars have been used under the shovel and the loaded cars pulled back by cable a short distance before dumping. Three tunnels have been blasted through in the canyon, their total length being 850 ft., the muck remaining after the blast being hauled out in side dump cars and dumped down to the edge of the river.

The solid rock cliffs are all hard and even the loose rock sections have been difficult to handle because of the presence of huge boulders buried under the surface in such a way that they have been hard to blast out. In places it has been necessary to work against the face of the river, where it would be sure death for the entire crew should any of the large boulders above break off and come down. In such places the drillers hang by ropes from the cliff to do the work.

Two shovels working at the lower end of the canyon have about 4000 ft. of work ahead of them. There is about 1000 ft. of work ahead of the shovel on what is known as section B. It is expected that the shovels will meet some time during the coming month, which

A TYPICAL SECTION OF THE WIND RIVER CANYON. THE HIGHWAY MAY BE SEEN AT THE LEFT

LETTING GO A BIG BLAST

will open up the road throughout the entire canyon. There is still a large amount of finishing to be done, however, and it is impossible to say when this will be completed.

The work on the upper end probably will be completed by winter. One bridge across Bird's Eye Creek is still to be finished and there is considerable concrete work to be done on culverts, etc.

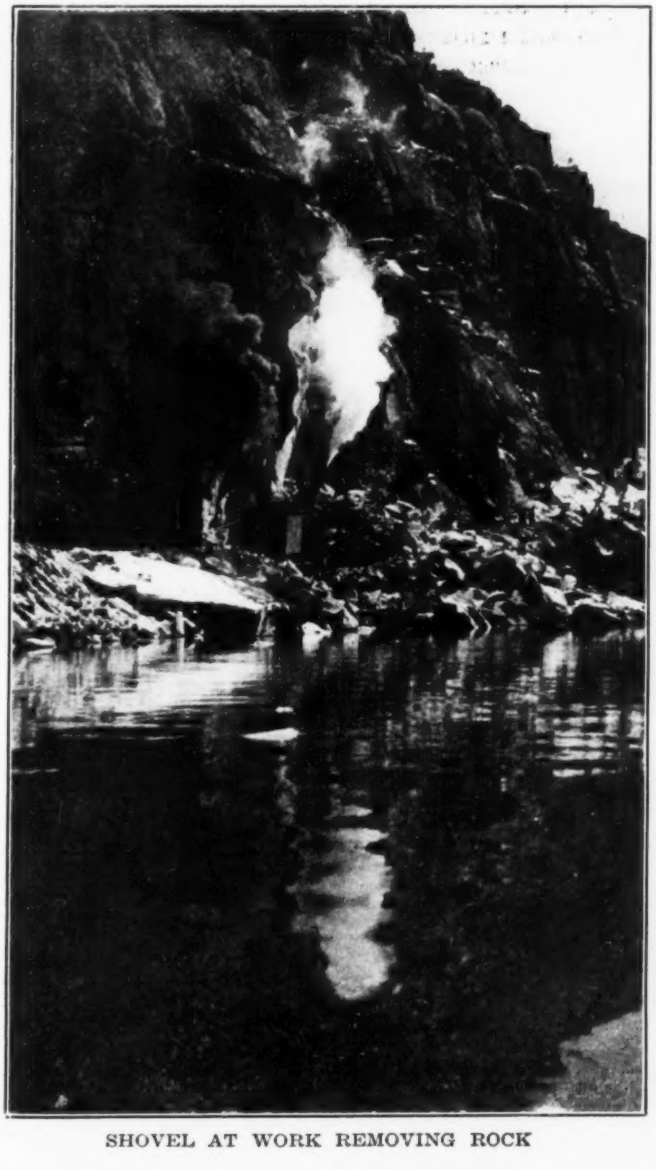
Even before actual construction work could begin, the contractors and engineers had to solve some real problems. The site of the road in the bottom of the canyon with walls around 2000 ft. high made it no easy matter to get the equipment on the job. The railroad was of no great use because of the fact that it was on the other side of the river. One of the steam shovels forded the river under its own power and the others were taken over on temporary bridges which were built for this work. As mentioned in the October issue of SUCCESSFUL METHODS, Wyoming was visited last summer by some extremely wicked cloudbursts and these bridges were carried away. Therefore, when the time comes to get this heavy equipment out, there will be another problem to solve. Since the bridges disappeared, materials and supplies have been ferried across the river, but this is by no means a satisfactory method.

The water supply system for the shovels and other equipment also provided a problem. The river is so muddy that the water is not suitable for use in the shovels, and so pipes have been laid from springs in the cliffs, and in some cases the water has been carried a mile or more. In one place it was necessary to get the spring water on the opposite side of the canyon and siphon it across the water.

N. T. Olson is the resident engineer on the job. Z. E. Sevison, State Highway Engineer of Wyoming, has general oversight of the project and R. L. Silver, district engineer with headquarters at Basin, is directly in charge of the State's interests.

When completed, the Wind River Canyon road will take its place among the famous scenic highways of the United States, such as the Columbia River Highway, Storm King road, etc., and will shorten the route to Yellowstone Park as well as remove an exceedingly difficult climb over a mountain range.

A job of this character is typical of the highway work which is being done in all parts of the United States, and even the States of comparatively small population like Wyoming are doing their full share.



SHOVEL AT WORK REMOVING ROCK

MAKING CITY BRIDGES SAFE

Novel Repair Job—Placing Riprap Around Foundations

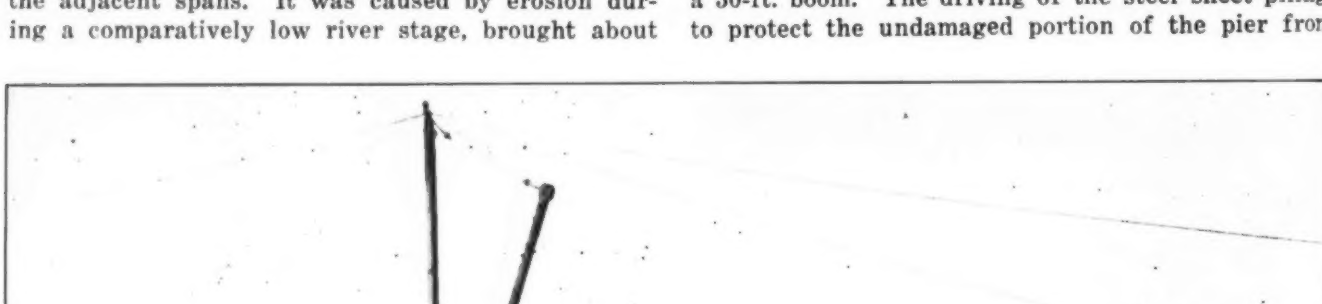
By IVAN E. HOUK,
City Engineer, Dayton, Ohio

THE work of repairing the Third Street concrete arch bridge in Dayton, Ohio, two spans of which failed due to undermining of the upstream end of one of the piers, involved several unusual and interesting construction operations. For instance, it was necessary to sink steel sheet piling through a part of the base of the old pier, to drive some piling underneath the remaining portions of the damaged arches, to install horizontal timber struts between the adjacent piers to relieve the unbalanced loading stresses, and to place riprap around the undamaged foundations so as to prevent further scour.

WHEN THE PIER SETTLED THE SPAN COLLAPSED AND DROPPED A COUPLE OF CARS INTO THE STREAM

The partial failure consisted of the settlement of the upstream half of one of the piers and the accompanying falling in of approximately 20 per cent of the adjacent spans. It was caused by erosion during a comparatively low river stage, brought about by the current being thrown along the pier. Although the bridge had stood safely for about 17 years, unfortunately the foundations had not been built on piles and had not been carried to any appreciable depth below the river bed. The extent of the damage is shown in the accompanying illustrations. Luckily no pedestrians, and only two automobiles, were on the damaged portion of the bridge when the collapse occurred. They can be seen in the photograph.

The paving, sidewalk and fill were removed from the damaged portion of the bridge and from the two adjacent spans; the concrete in the upper part of the damaged pier was broken up by shooting, and the debris was removed by a dragline, mounted on a scow and equipped with a 60-hp. boiler, a ¾-yd. bucket and a 50-ft. boom. The driving of the steel sheet piling, to protect the undamaged portion of the pier from



TIMBER STRUTS, PUT UNDER 75 TONS COMPRESSION BY HYDRAULIC JACKS, COUNTERACTED THE UNBALANCED ARCH THRUSTS AT THE ADJACENT PIERS

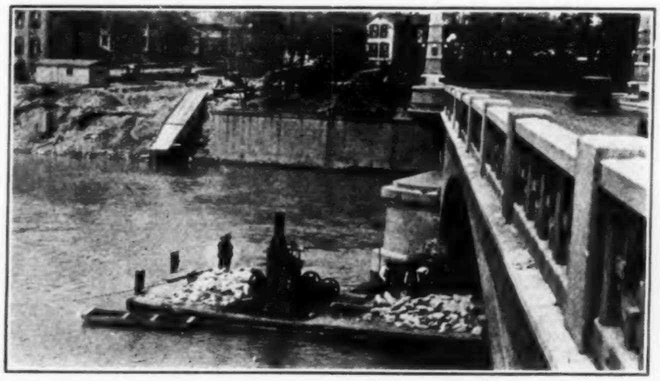
CONCRETING EQUIPMENT WAS PLACED ON TOP OF UNDAMAGED PORTION OF BRIDGE

undermining as well as to provide a cofferdam for the new work, was then begun. The piles were started entirely around the cofferdam, so as to form a tight inclosure, and were driven to the required depth where the old footing did not interfere, and as deep as possible where the old concrete was encountered. The water was then pumped out, the concrete under the piling and within the cofferdam drilled, shot, and removed, and the piling driven deeper. In this way the piles were worked entirely through the base of the old pier, and then driven to the necessary depth. Timber pile bents, for use in form construction, were driven at 10-ft. intervals through each of the damaged spans.

Horizontal timber struts, about 200 ft. long, reaching from the springing line of the adjacent pier on one side to the springing line of the adjacent pier on the other side, were installed and put under 75 tons compression in order to counteract the stresses caused by the unbalanced loading. The desired compression was obtained by hydraulic jacks. When the pier shaft was poured the struts were simply boxed in and concrete poured around them. After the arch rings were poured and had set sufficiently the pressure was released, the struts removed, and the holes in the pier filled with concrete. The concrete mixer, a ¾-yd. machine, was located on top of the bridge and the concrete transported to the forms in buggies.

The other foundations of the Third Street bridge and such foundations of the other bridges as were found to be in danger of being damaged by scour were made safe by placing riprap entirely around them. This riprap was made 3 ft. thick at the faces of the piers or abutments, was extended 15 ft. out from the concrete, and was made 18 in. thick at the outer edges. The river bed around the piers was excavated to make room for the rock, except in places where it was already low. In the case of the Dayton View bridge, where the work was done by the contractor who made the Third Street bridge repairs, the excavation was made by a dragline machine mounted on a scow. There the work of placing the rock was also carried on by the use of a scow. The rock was chuted from the bank to the scow, the scow moved about by cables running from a hoisting engine on the scow to anchors on the bank, and the rock dumped from the scow directly into place along the piers. The rock was mostly one-man stones, weighing from 100 to 200 lb. each. Stones lighter than 50 lb. were not allowed, but some as heavy as 400 lb. were used.

The total cost of the repairs amounted to approximately $190,000. Plans for the work were made by Harrington, Howard and Ash, consulting engineers of Kansas City, Mo. Glenn M. Wiley was the contractor on the Third Street and Dayton View bridges and the E. H. Fauver Company on the other bridges. George F. Baker, now service director, was city engineer at the time the work was done.



ROCK FOR REPAIRS WAS CHUTED FROM BANK TO SCOW WHICH WAS MOVED BY HOIST ON SCOW

CONVEYOR SOLVES A PROBLEM

Cuts Labor Cost in Keeping Mixer Supplied on Underground Concreting Job in Milwaukee

AN efficient plant for underground concreting on the Metropolitan Sewerage Project in Milwaukee, Wis., has been developed by Wenzel and Hennoch, contractors. This plant consists of a concrete mixer supplied by an overhead bin, which in turn is kept filled by a portable conveyor.

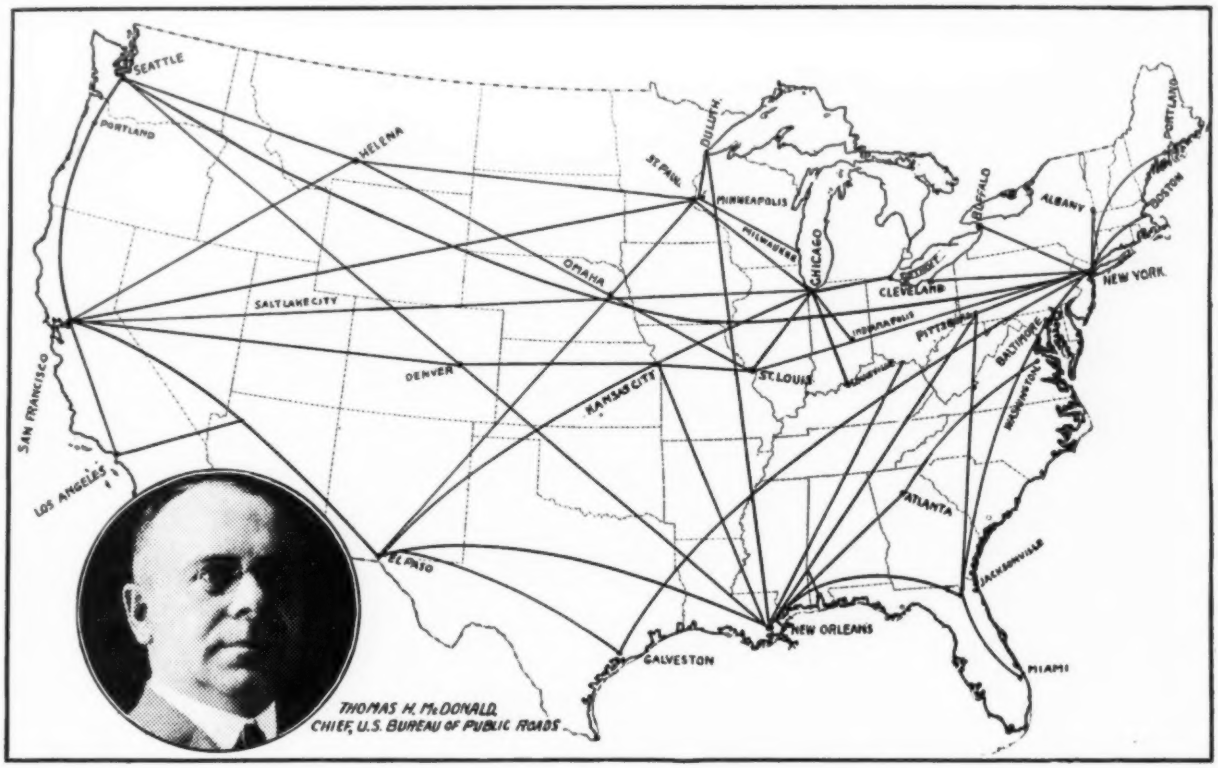
TRUCK DUMPING LOAD INTO ENLARGED HOPPER OF CONVEYOR

Before the installation of the conveyor two other schemes were tried. At first a dump car running between the mixer and storage piles built in the street was used, but this method required seven men. Then a bucket elevator was substituted. Finally the present plant was constructed and has been working even since with a force of only three men. The man required on the conveyor puts in less than one-fourth of his time in that work and is free the rest of the time to help out about the mixing plant.

The bin shown in the lower photograph on this page is divided into two compartments, one holding 30 yd. of stone and the other holding 15 yd. of sand. From this bin the materials are proportioned for the mixer below. The amount poured is limited, because only a certain number of forms can be made ready each day for the underground work. The conveyor loads the bin in the mornings, being shifted so as to discharge either into the sand or the stone compartments. It has unloaded 10 large trucks of 4-yd. capacity in 50 min.

THE BIN AND MIXER MAY BE SEEN AT THE LEFT. THE CONVEYOR HOLDS THE CENTER OF THE STAGE

ONE YEAR OF ROADBUILDING



THOMAS H. McDONALD
CHIEF, U.S. BUREAU OF PUBLIC ROADS

EVEN those readers of SUCCESSFUL METHODS who are identified with highway work and therefore are reasonably familiar with the roadbuilding situation, are likely to be surprised when they get a chance to visualize the number of miles of surfaced roads that are being built in the United States in 1923. Through the American Road Builders' Association, Thos. H. MacDonald, chief of the United States Bureau of Public Roads, has just announced that during the present calendar year approximately 40,000 miles of surfaced roads are being constructed. The map on this page shows just what 40,000 miles of roads would mean if they were laid out on a countrywide plan to connect the large centers of population. Of course, they are not laid out in this manner, but are being built here, there and everywhere, although in time a large proportion of them will become integral parts of transcontinental and interstate highways. The map shows clearly, however, the great magnitude of the nation's yearly roadbuilding program.

One of the most important factors in the great movement for more and better roads which has resulted in the construction of improved highways at the rate of 40,000 miles a year, is the American Road Builders' Association, which was organized more than twenty years ago and which holds an annual convention and road show. The 1924 convention and show will be held in Chicago, the convention at the Congress Hotel and the show at the Coliseum, from Jan. 14 to 18 inclusive.

The sessions of the convention will be open to men identified with and interested in highway work and will attract men from every part of the country. At the show in the Coliseum all of the latest and approved appliances for road construction will be on exhibition. The officers of the association are: President, Frank Page; secretary, E. A. Birchland, and treasurer, James H. MacDonald. The members of the executive committee are: Chairman, Frank Page; S. T. Henry, James H. MacDonald, Wm. R. Smith and T. J. Wasser.

The need for road construction at so rapid a rate as 40,000 or more miles a year is emphasized by Mr. MacDonald, who says that highway building should be continued as fast as the physical limitations of labor and material will permit. The longer the job is delayed, the greater will be the ultimate cost to the people. The reason is that the traffic on the main roads has now become so heavy that the excessive cost of operating motor vehicles over bad roads outweighs the cost of constructing good ones. Referring to one of the more heavily traveled roads of the country—the Boston Post Road from New York to Boston—Mr. MacDonald shows that if the road were a dirt road instead of a paved road, as it is, the greater cost of the motor truck traffic alone would pay for a paved surface in about eleven years. If the tremendous passenger car traffic were considered, the saving would pay the construction cost in a much shorter period.

To illustrate the pressing need for all possible speed in the improvement of roads, Mr. MacDonald cited the tremendous growth of motor vehicle registration. By July 1 of the year the number of motor vehicles traveling the highways had increased to more than thirteen million, as compared with 1,711,339 in 1914. How directly the highway touches the lives of all the people is shown by the fact that there is now more than one motor vehicle for each ten people.

A MODERN HYDRAULIC GRAVEL PLANT

Barge Floating in Pit Dredges Ballast for Illinois Central Railroad

By W. A. Gelbach

A GRAVEL washing, screening and crushing plant, modern in all respects, unique in some respects, has recently been constructed by the Illinois Central Railroad Company. This plant is located in an extensive gravel pit owned by the company and located on its old main line about 2½ miles north of Forreston, Ill., and about 11 miles south of Freeport.

The Forreston Gravel Pit has been in use for many years. In fact, the railroad company began loading cars by hand in this pit 60 or more years ago, soon after this line was built. For about the last 30 years cars have been loaded here by steam shovel. Gravel from this pit has been used very extensively by the railroad on its Northern and Western lines.

The bank run of the gravel contains 20 to 30 per cent of material above the 2½-in. size usually specified as maximum for ballast, and a great many of these boulders are too large for use under railroad tracks as ballast. When using the bank run of gravel as loaded by a steam shovel it was necessary, after loading and hauling this useless material to a job, to dispose of it in order to clear the right of way. This incurred an additional expense. Experience has also shown that clean ballast affords a great saving in the expense of weeding track.

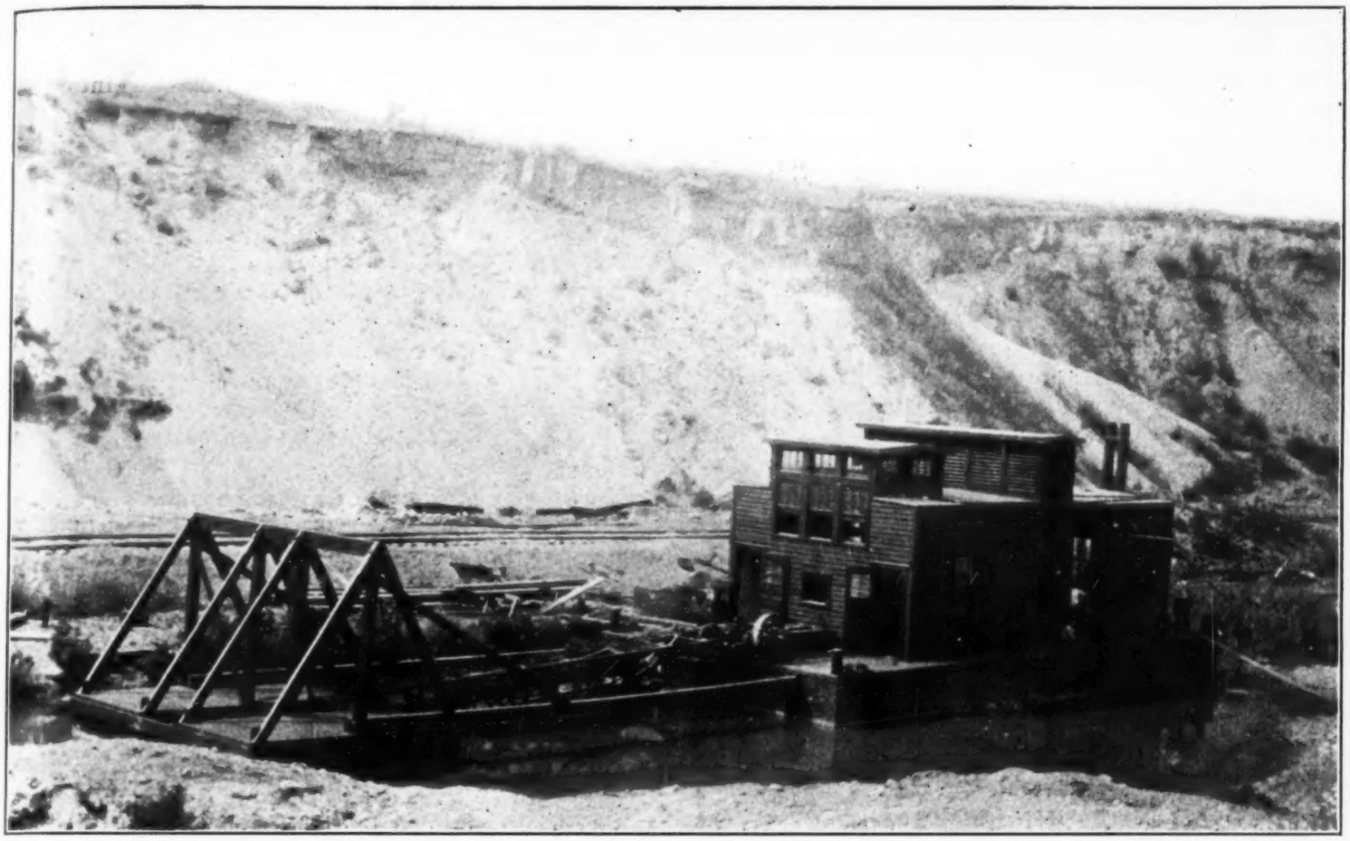
The deposit of gravel lies from 30 ft. to 60 ft. below the level of the ground water and at some points as high as 90 ft. above it. Streams to the south and to the north of the deposit prevent excessive variation of the level of the ground water. Hence the floor of the pit where recent loading has been done runs approximately level and within 3 or 4 ft. of the ground water line.

Invitations to bidders for the construction of a washing, screening and crushing plant were sent out by the railroad company in December, 1922. Bids were taken on two types of plants. The bids returned showed the hydraulic type of plant to be best.

In January, 1923, a contract was let to the W. J. Zitterell Company of Webster City, Iowa, for the construction of a hydraulic type of plant. The entire work was executed under the jurisdiction of F. L. Thompson, chief engineer of the Illinois Central System, and was under the immediate direction of Frank R. Judd, engineer of buildings, assisted by C. I. Anderson, assistant engineer. Engineering field work for the railroad company was in charge of L. S. Marriott, assistant engineer.

The W. J. Zitterell Company entered into a subcontract with W. H. K. Bennett of Chicago for the furnishing of all plant machinery, the furnishing and installing of all electrical equipment, the construction complete of the barge with its dredge pump and other equipment, and the pipe line connecting the barge to the plant. Mr. Bennett also furnished the general design of the plant. The balance of the work, in-

THE CONCRETE BINS AND SCREENING PLANT



BARGE FLOATING IN PIT WHICH PUMPS MATERIAL TO SCREENING PLANT

cluding the erection of the plant machinery, was handled by the W. J. Zitterell Company with the exception of the track work and electric lighting work, which was done by the railroad company. All executive work of the W. J. Zitterell Company was handled by G. C. Mills, vice-president. The engineering work was handled for the contractor in both office and field by W. A. Gelbach, supervising engineer, who was in direct supervision of the job.

Orders were placed for material and work on plans was started at once after the awarding of the contract. Field work was delayed until April 2 by adverse weather, but it was pushed vigorously despite continued bad weather from that time, as the railroad officials were particularly anxious to get the plant into operation.

The unit on which the production of the plant depends is a barge 26 ft. by 60 ft. with its equipment. The principal item of equipment on the barge is a 12-in. centrifugal gravel pump directly connected to a 400-hp., 2300-volt motor. The intake is through a traveling suction screen nozzle 45 ft. long, on which a chain with manganese steel fingers performs the double duty of loosening the bed of gravel and excluding boulders above 8 in. in diameter from the intake.

The barge also is provided with a hoist with four drums. Two of these drums are for use in moving the barge by means of cables anchored in the shore. The third is for raising the suction nozzle. The fourth is for operating a spud on the rear of the barge, the purpose of which is to serve as an anchor to steady the barge while it is working or swinging. A 2-in. centrifugal pump with direct connected 10-hp. motor is provided for priming the gravel pump and also for providing water seal for same while running.

The barge was launched in a pond of water where the gravel had formerly been dug out below the water level. Immediately after launching, the barge was afloat in 2½ ft. to 3 ft. of water. Due to a very dry season, the water subsided nearly 1½ ft. during the two months following, and by the time the heavy barge equipment was in place and ready for operation the bottom of the barge was resting firmly on the mud in the bottom of the pond.

The first pumping was done on June 28. At this time the water and gravel were delivered through two lengths of pipe to the bank in the rear of the barge, the water returning while the cutter ground its way deeply into the bottom of the pond. On June 30 the pipe line was connected to the plant and the first material was delivered to the bins. The first car of ballast was loaded on the evening of July 3. As the pumping continued the barge was moved ahead from day to day and was finally afloat in water 25 ft. to 30 ft. deep.

The material passes from the barge to the plant through a 12-in. iron pipe line. This pipe line is carried on pontoons to the shore, thence on stationary cribbing or on the ground to the plant. Provision is made for movement of the barge and pontoons in the water by means of rubber sleeve connections placed occasionally in the pipe line from the barge to the shore.

The 12-in. pipe line discharges its load of water, sand and gravel into a steel trough, which is installed

at an incline, and at the bottom of the trough a perforated plate with 3/8-in. slots is located. This perforated screen serves the purpose of removing the fine sand and bulk of the water. This dewatering and removal of excess sand is necessary for the proper working of the revolving boulder screen.

The boulder screen is equipped with screen plate having 2½-in. diameter perforations. The boulders retained by this screen are fed into an elevator which discharges into an elevated bin of about one-car capacity. The bin discharges directly into a crusher, which in turn discharges into the flume under the boulder screen and there the crushed material, together with the water, sand and all material from the boulder screen, passes on by gravity to a large concrete dewatering tank having twin compartments. The water overflowing from this tank returns to the pond where the barge is operating. Two dredging elevators, one operating in each compartment of the dewatering tank, elevate the sand and gravel to the top of the machinery house or head house, the floor of which is 62 ft. above the tracks. The elevators discharge into steel chutes, which deliver the sand and gravel into the revolving screens.

Two lines of screens, with three screens in each line, are used. The screens are 36 in. by 54 in. by 96 in. and have perforations of 1¼ in., ¾ in. and 5/16 in. respectively. The water and sand from the finest screens pass on to the sand launders, where it is either turned with the mixed stone to produce ballast or separated as desired for torpedo sand, engine sand, etc.

Five tanks or storage bins have been provided. These bins present a new departure in sand and gravel plant construction. They are of reinforced concrete, 21 ft. inside diameter, with 9-in. walls. The reinforcing consists of twelve vertical ½-in. diameter round bars in each bin, and horizontal circular bars ranging from ¾-in. round bars, 4-in. centers, at bottom of the 40-ft. bins, to ½-in. round bars, 9-in. centers, at top of bins. They were built with continuous pouring, using sliding forms, in accordance with the established practice in grain elevator construction. Timber and sometimes steel plate are the usual materials used for the bins of sand and gravel plants, and hence these concrete bins present an unusual appearance.

Three of these bins are 30 ft. high and two are 40 ft. high. Chutes from the screens are so arranged that the three sizes of stone may be run separately into the first three bins, or by use of butterfly gates two or three of these sizes may be mixed in any one of the first three bins.

Six sand settling tanks, or launders, tripping by gravity, are provided. Two of these are placed over the third or center bin and are intended to produce sand without separation into sizes, which is turned into the third bin together with all three sizes of stone for ballast. The third bin, therefore, is the bin in which all ballast is made, it not being possible to mix sand with stone in any other bin.

Two sand launders each are placed over the fourth and fifth bins. When ballast is being produced all sand is run into the launders over the third bin. When separated sand is desired, the gates to these launders are closed and the sand is washed over stationary screens over the launders supplying the fourth bin. The balance of the material then passes into the launders over the fifth or last bin. Fine sand is therefore obtained in the fourth bin and coarse sand in the fifth bin.

The trackage of the plant consists of a yard for empty cars of about 60-car capacity, a yard for loaded cars of about 70-car capacity, a loading track each side of the plant, and a passing track for removing loaded cars. The empty cars are stopped in the yard on a 1 per cent grade and dropped on this grade to the plant, where they are stopped on a 5 per cent grade, loaded, started again by means of a car puller, and dropped down another 1 per cent grade to the load yard.

Electric power is obtained from a power line which parallels the Illinois Central tracks at this point. A 2300-volt line from the power company's substation delivers power to the plant. This line is carried to the barge by means of a specially insulated flexible cable carried on tripods on the shore and supported on the pipe line pontoons over the water. A reel house is provided near the plant, housing a triple reel on the barge provides 440-volt current for aall motors the winter months while the plant is idle or on which extra length of cable may be wound. A transformer on the barge provided 440-volt current for all motors except the main pump motor, and a transformer located near the plant provides 440-volt current for all motors used there.

The electric lighting work, which was done by the railroad company's forces, is very complete and effective. Six large flood lights, located on the machinery house on the top of the plant, light up the vicinity of the plant and both the empty-car and loaded-car yards. On the barge, three flood lights give the operator very advantageous working conditions and one of these lights may be adjusted to light up the pipe lines.

The operation of the plant was taken over by the railroad company on July 1 and is being operated by the Maintenance of Way Department, who have employed John Markman as superintendent. Work on a night shift was begun the night of July 31. The force required to run the plant, based on running a day shift only, is as follows: One superintendent—directing; one assistant superintendent—office work, billing cars; one barge man—pumping; one barge helper; one screen tender; one man on crusher, boulder screen, etc.; two men loading cars; four men running cars (empties and loads); one man on car puller.

The rated output of the plant when in full operation is about fifty cars per day of ten hours. This output, however, undoubtedly will not be attained during the present season. The barge is still operating in too small a lake to work efficiently, it being necessary to shut down the plant frequently to add new lengths of pipe to discharge line. Production is further very much reduced by a very hard stratum about 4 ft. in thickness which lies about 10 ft. below the surface of the water. The necessity of training an entire new force of men for both day and night shifts has also had its effect.

Repaving London's Streets

1—A portable crusher is used to break up the old surface which is then used in making the new. © *Gilliams*
2—A small mixer on the job. © *Gilliams*
3—A general view of the repaving of Whitehall with the memorial to Britain's unknown soldiers in the background. A rather primitive wheelbarrow seems to have a part in the work. © *International*

CONTRACTORS AND ROADBUILDERS TO HOLD JOINT SESSION IN CHICAGO

A JOINT meeting of the Associated General Contractors and the American Road Builders' Association will be held in Chicago on Thursday, Jan. 17, 1924, to discuss various matters of importance to the membership of both organizations. This joint meeting has been made possible by the proximity in dates of the annual meetings of these organizations in Chicago. The 1924 convention of the American Road Builders' Association will be held Tuesday, Jan. 15, to Friday, Jan. 18, inclusive, while the Associated General Contractors meet the following Monday, Tuesday and Wednesday.

All the officers, the executive committee and the heads of the twenty-eight chapters of the Associated General Contractors will, however, be in Chicago the previous week. Many of the members of the organization also will be in Chicago that week attending the convention and road show of the American Road Builders' Association. Details of the program will be announced shortly.

CRANE CUTS COST OF WIDENING ROAD

WIDENING a road may be classed as the sort of special job on which it is easy to run up costs very quickly. On such a job in Detroit a crane mounted on a motor truck was put to work by the Coffman Crane Service. This crane went to the job at motor truck speed and when it got there excavated 300 yd. of material in a day at a total cost, including operator, fuel, interest, depreciation, etc., of $25 per day. The saving over hand labor is obvious, and in this particular case the crane, with the assistance of 8 trucks, did the work of 75 men and 14 trucks. As may be seen from the photograph, it was possible to obtain full buckets of material and so lose no time in loading the trucks.

CRANE EQUIPPED WITH CLAMSHELL WIDENS ROAD

MOVING HOUSES SAFELY ON NARROW-GAUGE TRACKS

Maryland Contractor Hauls Nine Structures to New Locations

MOVING houses on narrow-gauge tracks is a plan that has been tried out successfully at Hagerstown, Md. Eight of the buildings were frame 6-room

TURNING ONE OF THE FRAME HOUSES

houses and one was a 12-room brick and stucco house. Although the ground was in celery ridges, yet with the use of a 4-horse grader a good level roadbed was made and then the tracks were laid on narrow-gage ties. By using a 6-in. by 10-in. timber with a truss rod support, 4 pony trucks of 4 wheels each were coupled together from track to track. Then a 14-in. by 14-in. timber, 44 ft. long, that rested directly over the king bolts, coupled up each set to suit the length of the building to be hauled. Needles 12 in. by 12 in. by 36 ft. were used as carrying timbers.

DOUBLE BRICK HOUSE ON THE MOVE

All of the houses had cellars 6½ ft. deep. By grading down and removing the foundation walls, it was possible to back the hauling frame far under each house. Coming up crosswise to them, it was necessary to give each house one-quarter turn to place it on the platform. Rollers were used for this turning. As it was necessary to use a sharp curve at the new sites, the rear end of the buildings could not land over the lot just right. This was remedied by laying the tracks on past the location, and then the tracks were opened back in the rear and thrown over by crowbars, so that each house would land just right when backed up. Wherever it was necessary to turn a house completely around it was done by using two sides of a "Y," as railroad engines are turned.

The double brick house was not loaded on this railroad track, but was rolled on six nests of iron and wood rollers, every other one being wood and iron, 10 in a nest, a 4-in. by 12-in. shoe, lined with ½-in. steel plate, 7 ft. long. Under each end wall of the building a steel I-beam, 6 in. by 20 in. by 40 ft. long, was placed, and three pieces, 12 in. by 12 in., were placed up under the joist. Then 12 by 12's 36 ft. long, and steel I-beams 5½ in. by 15 in., 36 ft. long, were used every 4-ft. centers as cross needles, coming up under with a 14 in. by 14 in., 44 ft. long, as carrying timbers, placing shoes and nest of rollers under this timber.

The track was filled up level with the surface of the rail with 4-in. crossing plank, with third rail laid in the center, making a complete track of 3-ft. gauge. The time for truck moving was 10 ft. to the minute; for the rollers moving, 2½ ft. to the minute.

The power for hauling was an improved capstan, with a ⅝-in. cable 610 ft. long, all anchored to dead men ahead, using snatch blocks around curve, wound up by a horse to a 11-ft. sweep, using single line on truck hauling, rollers, block and tackle.

The frame houses each weighed about 100 tons and the brick about 250 tons. These houses were moved to their new location through a peat marsh, but the work was accomplished with only the slightest damage here and there. The contractor was E. G. McGill, Cumberland, Md.

The three photographs on this page show various stages of the work. The moving of the brick house which, of course, was the piece de resistance of the whole job, is shown in the center picture, and every individual brick is bearing up well under the strain. Work of this character, which demands ingenuity and resourcefulness, is constantly cropping up in all parts of the United States. The contractor simply has to sit down, puzzle the thing out and get to work, which Mr. McGill did.

READY TO GO UNDER A HOUSE

CHICAGO BUILDS BIG STADIUM

Great Structure on Lake Front Will Be Ready Next Spring

FOR many years Chicago has felt the need of a modern stadium within easy reach of the railroad stations and downtown shopping district, a central gathering place, where military drills, civic pageants or Olympic contests could be held with comfort and convenience. The development of the lake front from Grant Park south under the direction of the South Park Board furnished the opportunity for realizing this ambition. The new Field Museum is one unit in this development; the proposed Illinois Central Station is to be another unit. The Stadium will be in architectural harmony with these other units and will be a reality within a few short months.

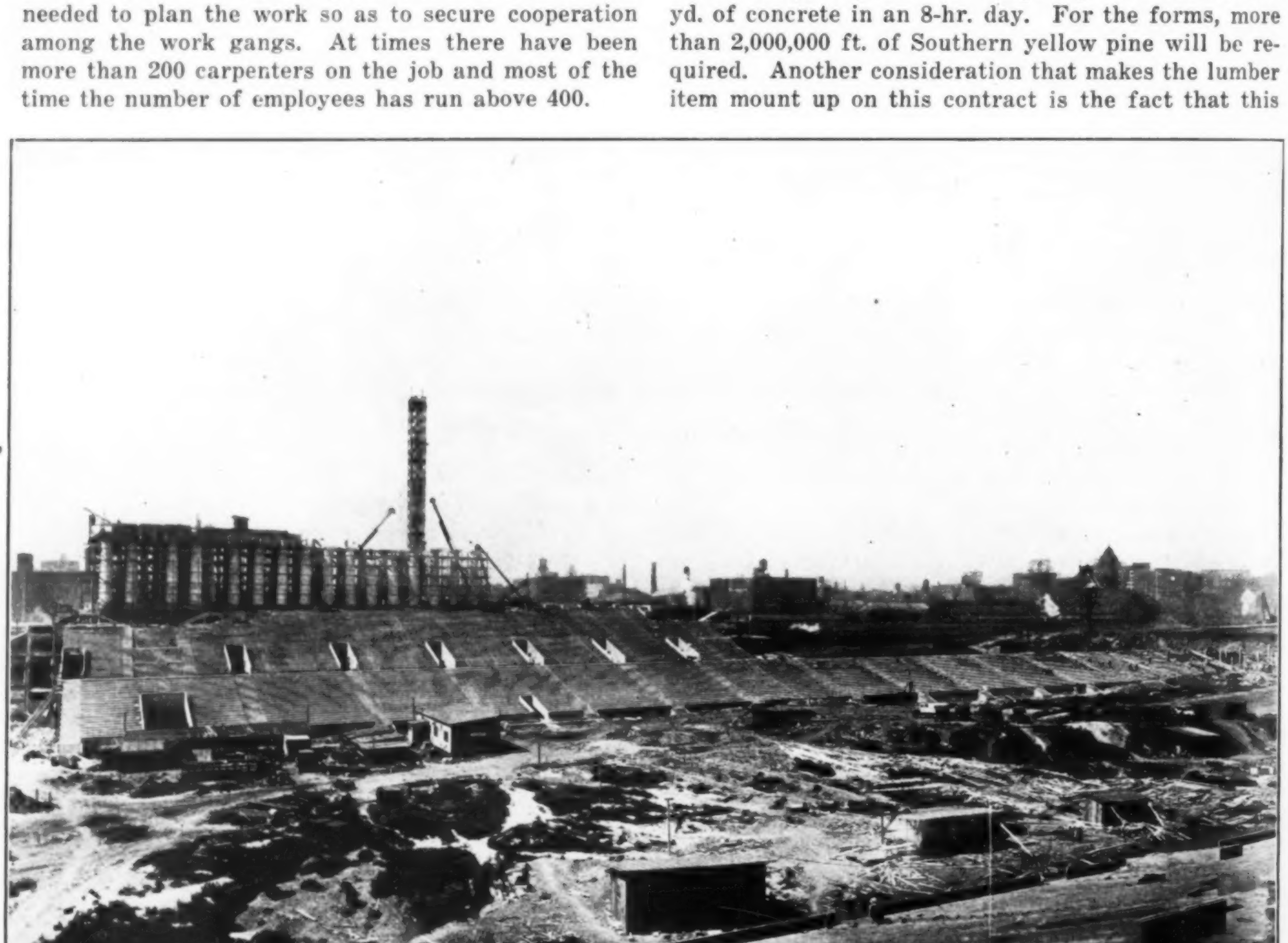
In the construction of the sides of the Stadium an unusual plant layout has been necessary. There are two complete concrete plants, each with its own railroad for the delivery of construction materials. Furthermore, the work was so planned that whenever concreting should be in progress on one of the halves no such work should be under way on the other half. This arrangement made it possible for one labor force to be used to run the two jobs. Much care has been needed to plan the work so as to secure cooperation among the work gangs. At times there have been more than 200 carpenters on the job and most of the time the number of employees has run above 400.

To handle the concrete, six towers have been built, three on each side. The supplementary towers are slightly smaller than the central hoisting towers. They have been needed to give greater flexibility to the handling of the chutes and to bridge the great distance between the main tower and the end of the chute at the longest reaches. This was of first importance, as all concrete is being poured directly into the forms by means of these chutes.

The usual storage bins and mixer are located at the foot of each main tower. Here, also, are the sources of power needed in the operation. All power on this job is steam except that for the cutoff saws. Steam locomotives haul the carloads of materials to storage yards; steam cranes and hoists are busy on the job; steam is used for the mixers.

Each aggregate bin is divided into two parts. One will hold 200 cu. yd. of stone or gravel; the other 100 cu. yd. of sand. A stiff-leg derrick with a clamshell bucket transfers the sand or gravel from the cars to the bin.

The complete plant has a capacity of about 400 cu. yd. of concrete in an 8-hr. day. For the forms, more than 2,000,000 ft. of Southern yellow pine will be required. Another consideration that makes the lumber item mount up on this contract is the fact that this



THE INTERIOR OF THE STADIUM SHOWING THE BANKS OF SEATS ON THE WEST SIDE

THE CHICAGO STADIUM IN A NUTSHELL

Total length of stadium, 1014 feet.

Width of each side, 180 feet.

Width of arena, 300 feet.

Total width of stadium, 660 feet.

Seating capacity of section being built, 60,000.

Ultimate seating capacity, 100,000.

Type of construction, reinforced concrete.

Cost of face stone, about $400,000.

Total cost of unit now under construction, about $3,000,000.

Purpose, holding athletic contests, military drills, pageants, Olympic games, etc., exhibition halls.

Built for the South Park Commissioners, City of Chicago.

Contractors, Blome-Sinek Company.

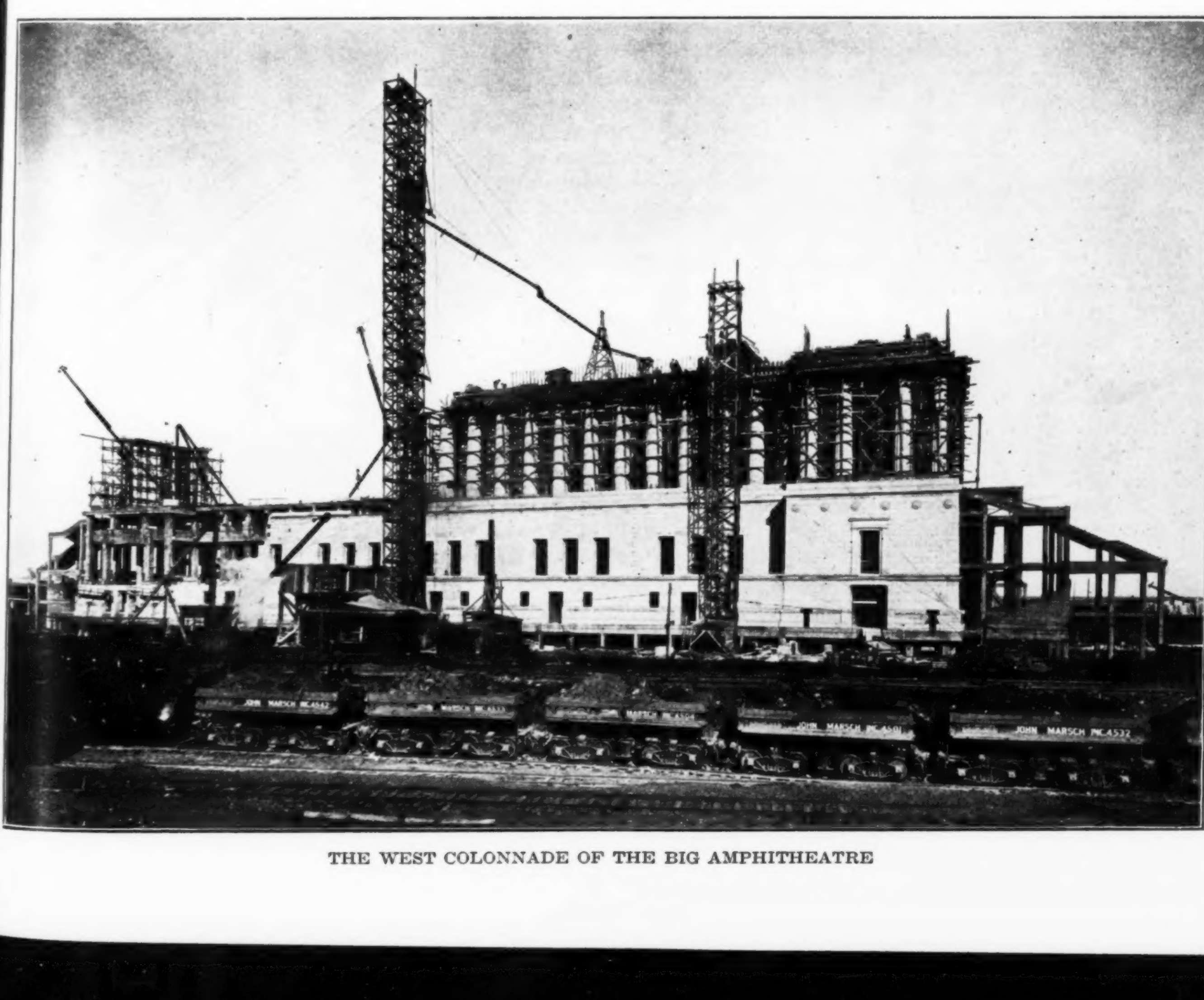
Date of completion, June 1, 1924.

big building, with its own great natural weight and built to sustain the shifting weight of tens of thousands of spectators, stands on made land. Chicago has been busy adding to this lake front; motor trucks have brought in tons upon tons of waste material; dredges have brought an equal amount of sand from the lake. Because of this made land it was decided to have each pillar rest on piles. For the entire stadium more than 5000 piles, mostly cypress, have been driven down from 55 to 70 ft. to the hardpan that rests upon the bedrock.

Each side is being constructed in separate units. A $\frac{1}{2}$-in. open joint is provided to connect each unit to its neighbor. By this method a total of $17\frac{1}{2}$ in. has been provided for expansion in the length of each side. The structures are of the reinforced concrete skeleton type. The roof is in the form of a continuous slab formed of the threads and the raisers of the seats. In planning the construction work it was decided that each separate section, from joint to joint, should make up one day's work. By following this method, all construction joints were automatically eliminated.

In planning a structure of this magnitude it was decided that the cost of true marble would make this material prohibitive. Accordingly a precast concrete unit was determined upon for all exterior work. This material is manufactured by the Benedict Stone Corporation of Tuckahoe, N. Y. The units are hollow blocks of reinforced concrete with a mottled face that gives them much the appearance of some marbles. They are molded or tooled to the required shapes.

Good progress is being made on the work. It is believed that the two sides of this U-shaped structure will be ready for the opening games by June, 1924. With this great arena and spacious amphitheater available right in the heart of the city, the planners are convinced that Chicago is bound to become a great center for athletic events, drills and elaborate pageants.



THE WEST COLONNADE OF THE BIG AMPHITHEATRE

MICHIGAN UNIVERSITY TO CONDUCT HIGHWAY COURSES

As usual, the University of Michigan will conduct short period courses in highway engineering and highway transportation this winter. Prof. Arthur H. Blanchard, who has had charge of this exceedingly useful work for a number of years, announces a complete schedule of courses. The first of these courses will begin Dec. 3 and last to Dec. 14, 1923, and other courses will be given thereafter until March 14, 1924.

The Tenth Annual Michigan Conference on Highway Engineering will be held Feb. 11 to 14. In the last four years the attendance at these courses has increased steadily and 110 men took the courses last year. They varied in age from 23 to 56 years, the average age being 27 years. They came from the United States Bureau of Public Roads, State, county and municipal highway departments, consulting engineers' offices, contractors' organizations, university faculties, companies manufacturing motor trucks, highway machinery and materials, and the field of highway transport.

TRACTOR PINCH HITS FOR HOIST

The ingenuity of the average contractor when he runs into trouble is proverbial, and Nicholas Christofald of Pleasantville, N. Y., recently furnished an excellent example of how to handle an emergency. His hoist gave out while he was building a 4-story firehouse. As both hoist and elevator were indoors, it looked as though he was up against it for a little while, but he solved the problem by bringing in his tractor, rigging a line through a pulley to the drum of the hoist and operating the elevator with the tractor's power. There was just room enough indoors for the tractor to run back and forth and while it was on duty the elevator made 80 trips to the third floor and the flow of materials to the men working there was uninterrupted. The photograph shows the tractor on its indoor job.

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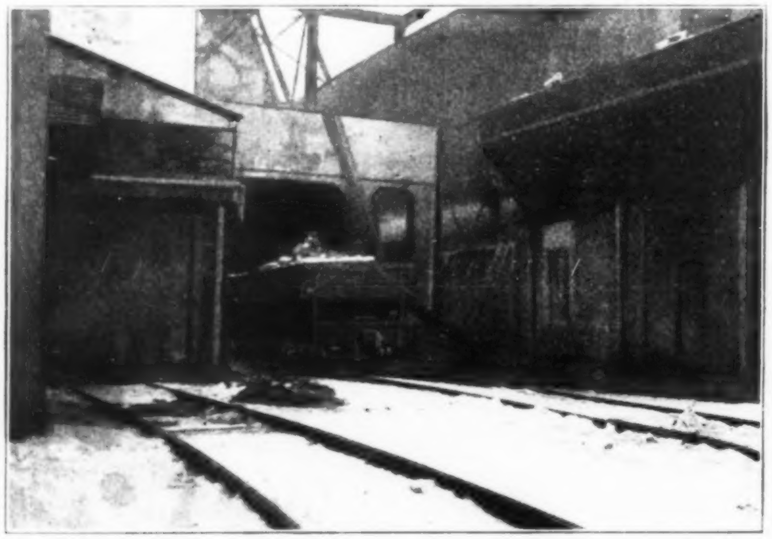

LOADING SCRAP AT A PENNSYLVANIA IRON FURNACE

HERE is where they load scrap iron into Western air dump cars at the Hokendauqua blast furnaces of the Reading Iron Company.

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